The Next Generation Air Transportation System: Transformation Starts Now

Robert A. Pearce
Acting Director
FAA Next Generation Air Transportation System
Joint Planning and Development Office

I want to thank ATCA and the *Journal of Air Traffic Control* for the opportunity to provide this high-level view of the Next Generation Air Transportation System (NGATS) and the progress we have achieved on the initiative. It is my hope that the articles contained in this special NGATS edition of the *Journal* will be informative and stimulate a healthy and productive exchange of ideas about this exciting and bold project. No one has all of the answers to building the system of the future; but by coming together and working collaboratively, we can create a system that works for all of us.

There is already consensus on our starting point. The current U.S. aviation system cannot meet 21st century needs. That was the conclusion of numerous studies and blue ribbon panels, including most recently, the National Research Council and the Walker Commission on the Future of the United States Aerospace Industry. And if we do not quickly take action, things could get much worse and the effect on our economy and global leadership in aviation could be devastating. We already have a capacity tinder box, not just at traditional hot spots like O'Hare, but throughout the entire system. Think of new choke points like Atlanta, Phoenix and even Ft. Lauderdale. The list keeps growing.

Most forecasts show that 20 years from now there will be two to three times the passengers, flights and cargo. The FAA predicts that even more airports will be congested in the 2020 time frame. By then, eight metro areas and 19 airports will need more capacity, and an additional 23 may need more.

Meanwhile, low-cost carriers, which use smaller aircraft that carry fewer passengers, are now major players, and are sending the number of daily domestic operations through the ceiling at airports like Dulles. Throw in a mix of new aircraft such as very light jets, jet taxis and unmanned aerial vehicles and there is the making of gridlock in our skies. We could even lose the cherished ability to fly anywhere on the same day.

Clearly, the existing system was not designed to meet this growing demand for air service. It was not designed to handle all of the new security enhancements that were layered over old ones. It was not designed to allow for anything the future can throw at us. The paradigms we have relied upon for almost 50 years cannot accommodate the massive change that has already begun.

In the short-term, we can use FAA's Flight Plan and Operational Evolution Plan to our best advantage. We can pour more concrete for runways. We can redesign airspace to wring out more capacity from the current system, and work with industry to make flying more efficient. We can better manage demand at our most congested airports and modernize rules and regulations to reflect new capabilities and technology. We can do all of this while enhancing our enviable safety record.

However, individually and collectively, those efforts – as important as they are – will not be enough. As Secretary of Transportation Norman Y. Mineta said in his landmark Aero Club speech in 2004, "The changes that are coming are too big, too fundamental for incremental adaptations of the infrastructure … we need to modernize and transform our air transportation system – starting right now." And if I can borrow a famous phrase from Gene Kranz, the great Apollo 13 flight controller, "Failure is not an option." The stakes are that high.

That is why the Administration and Congress rose to the challenge and proposed a unique public private partnership to transform the way our entire air transportation system works today, through the year 2025 and beyond. And system transformation not only involves new technology, but also changes in organizational structure, roles,

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and business practices that are out-of-date and not aligned with customer needs.

The first major transformational milestone was the enactment of VISION 100 – Century of Aviation Reauthorization Act (P.L.108-176) – which true to its name, laid out the vision for the Next Generation System and created the Joint Planning and Development Office (JPDO) umbrella organization to lead the initiative.

The Administration and Congress set the bar high. The mandate was for a system that addresses critical safety and economic needs in civil aviation while fully integrating national defense and homeland security improvements. Or as Department of Transportation (DOT) Under Secretary for Policy Jeffrey N. Shane put it, "Remember the best day you ever flew. That's what we want to achieve for every passenger every day in the Next Generation System – from airport curb to airport curb."

I want to stress too that DOT is not flying solo when it comes to the NGATS. The initiative was just too big and too complex to be successfully carried out by a single department or agency. Transformation cuts across agency lines and boundaries. The Next Generation System coalition also includes the Departments of Defense, Homeland Security and Commerce and NASA and the White House's Office of Science and Technology Policy. And as part of our new way of doing business we are also forging strong partnerships with industry. We are all in this together and we are coming together for the good of our great nation.

The Senior Policy Committee oversees the JPDO's work. It is chaired by the Secretary of Transportation and includes senior representatives from the participating departments and agencies and the Director of the Office of Science and Technology Policy. Among its key responsibilities, the Senior Policy Committee provides policy guidance and review; makes legislative recommendations; and identities and aligns resources that will be necessary to develop and carry out the Next Generation System.

One would be hard pressed to find anything in the annals of government history that comes even close to the Senior Policy Committee. And these senior government leaders are not merely talking the talk; they are walking the walk. To a person they are engaged and working together selflessly to align programs and plans to the NGATS.

We also took Secretary Mineta's words to heart. Transformation has started now and is ramping up in energy, intensity and focus. We delivered the NGATS Integrated Plan (Integrated Plan) to Congress in December 2004 (it can be viewed at www.jpdo.aero) This first-of-its-kind strategic business plan will guide the way for transforming today's rigid system into one flexible enough to adapt to changing market conditions and national security needs.

Indeed, it will transform every aspect of air transportation and travel. It will ensure economic growth through more affordable and easier-to-use air transportation. It will improve overall service. It will maintain American technological leadership. And, as always, it will keep safety at the top of every list. FAA Administrator Marion C. Blakey said it best: "This plan isn't something that's nice to have. If we don't move forward, we won't be able to catch up. Transformation is a must."

The National Plan will also be updated annually and expanded each year. As military strategists are fond of saying, "No battle plan survives the first encounter." A progress report covering the past year's activities was also delivered to Congress earlier this year.

Using an industry best practice, Integrated Product Teams (IPTs) have now been formed for each of the National Generation System's eight key capabilities, such as network enabled information access, agile air traffic management, performance based-services and layered-adaptive security.

The primary responsibility for assembling and leading each IPT belongs to one of the JPDO's member agencies. And each IPT will put together a detailed action plan to achieve their goals and objectives. However, to prevent any possible stove-piping, the JPDO must approve all of the IPTs' broad strategies as part of the Integrated Plan and ensure their plans and schedules are consistent with the overall roadmap and enterprise architecture.

And of course, the private sector must be directly involved in the transformation process now – not two years from now. For that reason, we recently stood up the NGATS Institute. It is an alliance among companies and organizations representing a broad range of all aspects of the aviation and air transportation industry and is co-chaired by the Air Line Pilots Association (ALPA) and Air Transport Association presidents.

The Institute will make sure that new concepts, technology and operational change can pass real world tests. Its first task was to help populate the eight Integrated Product Teams with the best and brightest experts industry can offer. The Institute

is also being called upon to perform studies and research in areas identified by the JPDO, and usually on a quick turnaround basis.

The importance of developing such a future system is also quite clear to policymakers in Europe, where a comparable effort is well underway. This presents both a challenge and an opportunity to the United States at this critical time for our nation's aerospace industry. Creating a modernized, global system that provides interoperability could serve as a tremendous boost to the industry, fueling new efficiencies and consumer benefits. Alternatively, we could also see a patchwork of duplicative systems and technologies develop, which would place additional cost burdens on an industry already struggling to make ends meet.

So, rather than sitting on the sidelines away from the action, the private sector will join with the government as a full partner in planning and building the Next Generation System. And partnerships extend beyond our borders. Under Secretary Shane recently testified before the U.S. Congress on why a next generation global system is so important not only in the United States but throughout the world:

Of great importance to the Next Generation System, the JPDO, FAA and the Commission of the European Communities have been working on a draft of a Memorandum of Understanding that establishes a framework for cooperation which may have been signed by the time your read this. They intend to explore opportunities for working toward commonality of Air Traffic Management Systems by implementing compatible technologies in their respective ground and air systems and developing common synchronized timelines for the implementation of the new technology. The key here is ensuring global interoperability where necessary.

2005 NGATS Products

1. **Operational Concept –** the starting point for the NGATS, it describes in detail the key design principles used to guide the development of the Next Generation System. It also lays out the eight key capabilities missing from the current system, but which will be an integral part of the future one.

2. **Evaluating the Concept** – a preliminary analysis was conducted that assessed and subsequently validated the NGATS' ability to accommodate three times the current number of NAS operations while maintaining or reducing the current level of delays.

3. **NGATS Roadmap** – a high-level path was created for achieving the eight key capabilities. It also identified important transition states and sequences and mapped them to the timeline leading to the envisioned future system.

4. **NGATS Portfolio Management** – JPDO focused on time-phased portfolios of specific improvements; the research, analysis and demonstrations that will lead to these future system gains; and the investments contained in the roadmap needed to achieve them.

As I mentioned earlier in this article, the JPDO wrote a progress report for 2005 and we had solid, measurable progress to report. We have already started conducting demonstration projects and in 2006, JPDO will launch a second wave that will help lay a critical technology foundation for the NGATS. These include the initial phase of ADS-B (Automatic Dependent Surveillance Broadcast), which will introduce dependent surveillance as a future system tool, and SWIM (System-Wide Information Management), which will permit network centric operations in the National Airspace System.

Also on deck for 2006 are LED (Light Emitting Diode) airport lighting, which improves visibility and cost-performance of runway and taxiway lighting, and Capstone Phase III, which extends safety benefits from technology such as WAAS (Wide Area Augmentation System) and air-to-air ADS-B to other parts of the state of Alaska. You can read more about these and future demonstration projects later in the *Journal*.

Of great importance, we brought the 2025 NGATS Operational Concept, which is the subject of another article in the *Journal*, into much finer definition. In contrast to today's rigid, brittle and unforgiving system, the Next Generation System will be flexible, scalable, resilient and adaptive.

We will take passengers from the airport curb to their airplane in 30 minutes or less with none of today's hassles but with a lot more security that will keep you safe while keeping your shoes on.

The concept also emphasizes end-to-end strategic flow management with minimal individual flight interventions. The Next Generation System will be highly automated and network centric so we get the right information to the right person at the right time keeping the nation safe and the flow of traffic running smoothly. And we will increasingly

cut the cord between ground and air as we put more data directly into the cockpit of intelligent aircraft through sensors and satellites.

The future system has safety and efficiency built right into it. Ultimately, air traffic management services will be tailored and flights will be managed based on individual aircraft and flight crew performance capabilities. We can reward aircraft that have advanced efficiencies and capabilities, such as precision navigation and the ability to land automatically, by allowing them greater operating flexibilities, such as flying in all but the worst of weather. That way a pilot can alter course and pick the fastest, smoothest and safest route and get you to your destination on time.

And through data sharing we will move from the old command-and-control regulations to risk management so we can prevent accidents before they happen. We can increase capacity three fold while bolstering our enviable safety record.

To help us reach this bold operational concept, we created the NGATS Capability Roadmap. It sets forth a clear, high-level path, timelines and key transition states and sequences leading to the 2025 system. And based on the roadmap, we developed the first portfolio of needed policy, research and modernization efforts.

We also lay out in the progress report the findings of our first preliminary interagency program review where we identified six examples of how the partner agencies could collaborate during 2007 to accelerate NGATS capabilities. They are: (1) jump-start ADS-B; (2) jump-start Network Enabled Information Access; (3) synchronize weather research and accelerate development; (4) define RTSP (Required Total System Performance) levels of service; (5) initiate dynamic airspace research; and (6) align environmental R&D.

And during this time of fiscal austerity, and as the Aviation Trust Fund continues to spend down, the JPDO was able to determine that Next Generation System costs are reasonable. Approximately $1.5 billion is spent annually on air transportation-related research and we cannot afford to go off in a dozen different directions. But by aligning every dollar, program and plan to the Next Generation System and with everyone pulling in the same direction, we can eliminate duplication and even save taxpayers money in the process.

Make no mistake about it; we mean business. The JPDO recently took a hard look at the entire portfolio of such research and the Senior Policy Committee has begun to align departmental/ agency resources. These important cost savings will be reflected in the President's FY 2007 budget submission and that is just the start of this JPDO good government process. Greater gains will be realized in future budget cycles.

I chronicle these milestones not to pat ourselves on the back, but to show that the Next Generation System initiative is for real. You have heard the old chestnut of the train leaving the station. Let me put it a different way. We have pulled away from the gate, trays are folded and locked, seats are in the upright position and we are gaining momentum down the runway. And we want you on board because we need you. We need your expertise. We need your unique perspective. We need your energy and commitment to collaborative problem solving that is a hallmark of ATCA. With your continued help and support, I am convinced more than ever that we will reach our ultimate goal and make the Next Generation System a reality. I hope you enjoy this special NGATS edition of the *Journal of Air Traffic Control* and I look forward to getting your feedback.

Robert A. Pearce
Mr. Pearce is a NASA executive serving as the Acting Director of the Next Generation Air Transportation System Joint Planning and Development Office. For the past two years, Mr. Pearce served as the Deputy Director of the office.

Previously, Mr. Pearce was responsible for strategy and program development for NASA's Aeronautics Research Mission Directorate. Mr. Pearce led the Directorate's strategic management efforts, developing the long-term direction for the total program, including investment strategy and the technical development of responsive programs.
Mr. Pearce began his career as a design engineer at the Grumman Corporation, working on such notable projects as the F-14 and X-29 aircraft as well as other advanced military aircraft and concepts. Mr. Pearce also has previous experience with the Department of Transportation examining the technology, policy and economic issues associated with new technologies for short-haul inter-city transportation.

Mr. Pearce holds a BS in Mechanical and Aerospace Engineering from Syracuse University and an MS in Technology and Policy from the Massachusetts Institute of Technology.